Mr. Dennett was also one of the most genial and simple-natured of men, and his death will be most deeply regretted by a wide circle here and in Africa. C.

SIR THOMAS WRIGHTSON, BART., M.INST.C.E.

SIR THOMAS WRIGHTSON, BART., a master of industry in the North of England, died at Neasham Hall, his seat on the banks of the Tees, on June 18, in the eighty-second year of his age. Like his cousin, the late Lord Armstrong, in whose Elswick works he served his apprenticeship, Sir Thomas combined a business aptitude with the qualities which go to make a research worker and inventor. He contributed numerous papers on professional and technical subjects to the Proceedings of engineering and metallurgical institutes and societies with which he was associated, but of his contributions to knowledge the one which is most likely to be remembered is connected with a pastime rather than with his profession. He was an ardent musician in his earlier years, and became interested in the power possessed by the human brain of resolving compound sound-waves into their component notes. He was not satisfied with the theory put forward by von Helmholtz in 1863, and in 1876, when giving a presidential address to the Cleveland Institution of Engineers, he put forward an observation which he afterwards made the basis of a new theory of the mechanism of hearing. This observation was that if the sine curves representing a compound sound-wave are plotted out on a zero line, and if it is supposed that each crest, trough, and "crossing point" on such a tracing could give rise to a stimulus on entering the ear, the time intervals of all the primary component notes could still be recognised. The cochlea, he supposed, must be able to detect these as pressure pulses, and acted not as a resonator but as an hydraulic apparatus. A little later he became involved in public life and in politics, and sat first for Stockton and afterwards for St. Pancras East in the Conservative interest. In 1906 he abandoned politics to devote himself anew to working out the idea he had first put forward in 1876. In 1907 he published a monograph under the title, "On the Impulses of Compound Sound Waves and Mechanical Transmission through the Ear." In this publication he describes and figures a machine of his own invention—an ohmograph he named it—by which he could combine the tracings of two, three or four simple notes into their combined form. Associating himself with Prof. (now Sir) Arthur Keith, a reinvestigation of the finer anatomy of the cochlea was undertaken, with the result that many facts came to light which were favourable to his interpretation of the mechanism of the internal ear, but could not be explained on the supposition that the cochlea serves as a resonator. In 1918 Sir Thomas brought his evidence together in the form of a book which was published by Messrs. Macmillan under the title, "An Enquiry into the Analytical Mechanism of the Internal Ear." The theory thus put forward is at present being subjected to a searching criticism, and if it be too much to claim that anything like finality has been reached, it may be safely stated that the author has made a contribution which has a permanent value for students of auditory mechanism.

Notes.

THE formal opening of the new Intermediate Scale Chemistry Laboratory of the Imperial College of Science and Technology by Mr. A. J. Balfour (the Marquess of Crewe presiding) will take place to-morrow (Friday) at 4 o'clock.

THE annual general meeting of the Research Defence Society will be held at 11 Chandos Street, W.1, on Wednesday, June 29, at 3.30, under the chairmanship of Lord Lamington. Dr. H. H. Dale will give an address on "The Work of the National Institute for Medical Research."

THE Semon lecture for 1920–21 in connection with the University of London will be given at 5 o'clock on Tuesday, July 5, at the Royal Society of Medicine, 1 Wimpole Street, W.1, by Dr. J. Horne, who will take as his subject "The Relationship of the Larynx to Pulmonary Tuberculosis." Admission will be free, without ticket.

A BILL to provide for the time in the British Isles being in advance of Greenwich mean time during a certain period of the year has been presented to the House of Commons.

THE president and council of the Royal Society have appointed Mr. H. Robinson, of the University of Manchester, to the Moseley studentship for research in molecular physics, the funds for which were bequeathed to the Royal Society by the late Lieut. H. G. J. Moseley.

THE John Fritz gold medal has been awarded by the National Societies of American Engineers to Mr. Schneider, past-president of the Iron and Steel Institute, in recognition of his work in connection with the development of artillery.

BY the will of the late Sir Felix Semon, the laryngological library of this well-known throat specialist is left to the Royal Society of Medicine.

A GOLD loving-cup was presented on Friday last by the members of the Royal Institution to Sir James and Lady Dewar on the occasion of their golden wedding.

IN consequence of the illness of Dr. J. Rennie, it has been found necessary to suspend the arrangements made by the Ministry of Agriculture and Fisheries for the examination of diseased bees. The Ministry will issue a further announcement as soon as other arrangements have been made.

AT the evening meeting of the Royal Geographical Society on Monday last the president stated that the society had heard with great regret of the death of Dr. Kellas, who had been invited to join the Mount Everest Expedition that he might carry out on Mount Everest the experiments in the employment of oxygen at high altitudes which he had already planned to carry out this summer on Kamet. It is feared that Dr. Kellas's death may have been due to his own untiring energy, for instead of resting after his great climb last summer he had spent nearly all the winter in climbing peaks in Sikkim.

Capt. Roald Amundsen has asked the Storting by telegram from Nome, Alaska, for 300,000 kroner (about 12,000*l.*) for the purpose of refitting his vessel, the *Maud*, in order to enable him to continue his expedition in the Arctic regions. The *Maud* lost a propeller off Cape Serge, and is to be towed to Seattle for repairs.

As already announced, the Congress of the Universities of the Empire will be held at Oxford on July 5–8. In the morning of July 5 the following subjects will be discussed: "The Universities and the Balance of Studies." (1) The place of the humanities in the education of men of science and men of affairs. (2) The place of the physical and natural sciences in general education. (3) The question of specialism in university curricula. In the afternoon: "The Universities and the Teaching of Civics, Politics, and Social Economics." "The Universities and Secondary Education." (1) The frontiers of the secondary school and the university. (2) The influence of university entrance requirements upon the curricula of secondary schools. In the morning of July 6: "The Universities and Adult Education." (1) Lectures for the general public within the walls of the university. (2) Extra-mural work. In the afternoon: "The Universities and Technological Education." In the morning of July 7: "The Universities and Training for Commerce, Industry, and Administration." "The Universities and the Training of School Teachers." In the afternoon: "University Finance." In the morning of July 8: "The Universities and Research." In the afternoon: "Interchange of Teachers and Students." (1) The institution of a Sabbatical year for professors. (2) Provision of temporary junior posts for graduates of Colonial and foreign universities. (3) How to raise funds to make a trust for the promotion of the migration of students. (4) Equivalence of entrance examinations. (5) Mutual recognition of study and examinations.

A national exhibition of maternity and childhood has been organised in Paris from June 15 to July 25. The exhibition is located in the Jardin Zoologique d'Acclimatation, Bois de Boulogne, and is divided into five sections. The object of the exhibition is to encourage larger families than at present obtain in France, and in the various sub-sections such subjects as the small birth-rate, its causes and prevention, infantile mortality, and the rearing of large families are dealt with. Conferences, *fêtes*, and sports are included in the programme. A large and influential committee has charge of the organisation, which is under the patronage of the President and Ministers of the Republic, the secretary-general being M. Em Brocherioux.

A provisional programme for the Paris Conference of the Museums Association, to be held on July 12–18, has been issued. The headquarters of the association while in Paris will be the Hôtel Moderne, Place de la République, and the meetings will be held at the Musée National D'Histoire Naturelle, Rue Cuvier. Papers on museum administration and numerous tours of French museums have been arranged, and there will be at least one joint meeting with the French Museums Association. Information regarding tickets, passports, and hotel accommodation, both for those attending the meeting and for those contemplating a more extended tour after the conference, can be obtained from Mr. W. J. W. Barrier, 31, Lime Grove, Shepherd's Bush, W.12.

A conference of the International Union against Tuberculosis will be held in London, under the auspices of the National Association for the Prevention of Tuberculosis, on July 26–28. The annual conference of the National Association will be merged in the larger gathering. The object of the International Union, which was founded last year, is to promote an effective combination of the nations of the world against tuberculosis, and its first president is M. Léon Bourgeois. For the occasion of the coming meeting, however, Sir Robert Philip will act as president. Official delegates from countries within the League of Nations, from America, and from authorities interested in the subject, are invited to attend. The principal business of the conference will be a discussion, opened by Prof. A. Calmette, on the modes of diffusion of tuberculosis throughout the races of the world. Sir Humphry Rolleston will open another discussion on the *rôle* of the medical profession in the prevention of tuberculosis. There will be an official reception of the Union by the Lord Mayor of London on July 26, and visits to institutions of particular interest are being arranged.

The executive committee of the council of the American Association for the Advancement of Science held its regular spring meeting at Washington, D.C., on April 24 last. The business transacted at the meeting is reported in *Science* of May 20, and some of the resolutions will be of interest to men of science in Great Britain. The next meeting of the association will be held at Toronto, and it was resolved that a special committee should collaborate with the local committee for the meeting to invite an eminent British man of science to attend to present papers before the section of the association to which his field of work is related and to deliver a general public lecture. The executive committee of the council also resolved that the British Association for the Advancement of Science be invited to send a representative to the Toronto meeting, and Dr. J. McK. Cattell was elected official delegate of the American Association to the forthcoming Edinburgh meeting of the British Association. A further resolution, which is of great interest in view of the letters which have appeared in our columns on the same topic, asks for the restoration of the privilege of duty-free importation of English scientific works by recognised educational institutions and faculties. The committee also directs the attention of Congress to the burden which would be imposed on scientific education and research by the proposal to repeal that part of the Tariff Act of 1913 which permits the duty-free importation of scientific materials, and on behalf of its 12,000 members asks for reconsideration of the suggestion.

A FURTHER step in the movement towards the standardisation of automobile, motor-cycle, and cycle parts has been taken by the British Engineering Standards Association in the formation of seven sub-committees the subjects and chairmen of which are as follows:—Nomenclature, Major C. Wheeler; Steels, Mr. A. A. Remington; Small Fittings, Mr. W. D. Williamson; Electrical Fittings, Mr. E. Garton; Shafts and Shaft Details, Mr. L. A. Legros; Wheels, Rims, and Tyres, Lt.-Col. D. J. Smith; and Cast Iron, Dr. L. Aitchison. Before the sub-committees actually embark upon the detailed work the various organisations concerned are being consulted in order to ensure that the proposed *personnel* meets with their approval as adequately representing their respective interests. In the meantime, technical data in regard to the specific subjects to be taken in hand immediately are being collected, and this should greatly facilitate the progress of the work as soon as the membership of the sub-committees is officially approved.

DR. A. C. HADDON selected as the subject of the Huxley memorial lecture, published in the Journal of the Royal Anthropological Institute (vol. l., part ii.), "The Migrations of Cultures in British New Guinea." He remarks that along the coast a traveller notices a series of cultures, some evidently related to one another, while others are as obviously unrelated. The differences indicate that there is no immediate relation between them, though their affinity points to a common origin. The cultural problems of the south-eastern peninsula and the outlying islands are in the main quite distinct from those of the west, and the differences between these two groups indicate clearly that there cannot have been any extensive cultural movements from the Papuo-Melanesian to the western Papuan. We are driven, on general grounds, to the supposition that the cultures of the southern coast of New Guinea came down more or less from the north. The difficulty is that we have as yet no precise knowledge of the inhabitants of the interior of the island, and the socio-religious customs of the natives of many of the coastal areas have yet to be investigated. The lecture, with its appendix of material, is a valuable contribution to our knowledge of the ethnology of New Guinea.

IT is a significant indication of the change of view in relation to anthropometry that in his paper on "Ancient Skulls from Greenland" Mr. W. E. Le Gros Clark (Journal of the Royal Anthropological Institute, vol. l., part ii.) remarks that many attempts have been made to deal with the various races of man as the zoologist deals with the various species of mammals; to find some specific features which may serve to differentiate the skull of one race from the skull of another, in the same way that the concave post-orbital process distinguishes the skull of a fox from that of a dog. "This method was carried to an extreme by Sergi when he subdivided the Mediterranean Race into a number of varieties, each characterised by the shape of the cranium as seen from above. These attempts have all failed, and it must be realised that the variation of individual skulls of modern races is so great that it is often extremely difficult to assign an isolated skull of unknown origin to a definite race with any degree of certainty." Mr. Clark points out that the construction of a type contour obviates these difficulties, and on its use the future of the science of craniology must depend.

ALL lovers of Oxford will welcome the pamphlet issued by the Clarendon Press in which Mr. H. E. Salter, after an exhaustive study of the college records and other literature, discusses "The Historic Names of the Streets and Lanes of Oxford. Intra Muros." It is remarkable that during the last 900 years only two new streets have been constructed—New Road in 1770, and King Edward Street about a hundred years later. The old lane near Christ Church meadow was called Shulinstoke, the pool above the mill where the cucking-stool was used; The Seven Deadly Sins was perhaps the sign of an inn, or a set of seven small cottages; Bocardo Lane was called after the Bocardo or Town Prison; the Turl was the Twirling Gate on the foot-way which led from Ship Street to Broad Street, and is not, like "The Broad," an undergraduates' abbreviation. Broad Street was known as Horsemonger Street in the thirteenth century, and that running from the west end of Broad Street towards the station was Irishman's Street. The author ends by suggesting that Cat Street should be restored for Saint Catherine's Street, Bocardo Lane for St. Michael's Street, and that Alfred Street should be re-christened Vine Hall Lane.

AT the Royal Society conversazione on June 15 an exhibit was given illustrating the life-history of *Chermes Cooleyi*, Gillette. This insect has been recently observed in Britain. It is spreading rapidly throughout the southern counties of England, and occurs in two localities in Scotland. A study of it is being made by Mr. R. N. Chrystal under the direction of the Forestry Commission with the view of working out its biology and determining its relation to Douglas fir and Sitka spruce plantations in this country.

VOL. LVIII. (pp. 483–576, 1920) of the Proceedings of the U.S. National Museum contains a revision of the Nearctic ichneumon-flies of the genus Apantales by Mr. C. F. W. Muesebeck. As natural controlling agents of injurious insects many species of Apantales play important parts. Thus the larvæ of the common cabbage butterfly, those of the gipsy and brown-tail moths, and many cut worms and army worms are heavily parasitised by these insects. There appears to be no authentic record of an Apantales having been bred from any insects outside the Lepidoptera. In this revision 164 species are known to the author, and a list of their hosts is appended wherever known. On pp. 327–62 of the same serial Mr. R. A. Cushman revises the ichneumon-flies belonging to the tribe Ephialtini, the members of which are internal parasites of Lepidopterous pupæ.

WITHIN a year after the armistice some thirty nations and States agreed to two series of international air maps, the general and the local. The Geographical Section of the General Staff has undertaken the work of those sheets which fall within the British Empire. In the *Geographical Journal* for May Lt.-Col. E. F. W. Lees discusses the proposed maps at some length. For the general map it appears that Mercator's projection, despite all its disadvantages, is to be employed, principally because of its use in navigation and the general training of pilots on naval lines. The scale is to be 3 cm. to 1° of longitude at the equator, and the index is to be based on the index of the international million map. An overlap of 1° of latitude and 3° of longitude is to be allowed. As regards colouring and symbols, some departures must necessarily be made from the conventional usages of maps for terrestrial purposes. Experience has shown what features are of value to the airman in locating his position and finding his way. All water is to be blue; aeronautical information, such as positions of aerodromes, seaplane stations, lightships, etc., black; roads, deep yellow or burnt sienna; railways red, because of their conspicuousness to airmen; and woods green. Red is also to be used for buildings. Hill shading for the depiction of relief on the general map was recommended by the International Convention, but the employment of the layer system does not lack advocates. The general ground colour is to be pale green for ground covered with vegetation and pale buff for arid ground. Names apart from those applying to aeronautical information will be sparingly used. The local maps are to be on a scale of 1 : 200,000. For these the International Convention does not suggest the use of Mercator's projection. An innovation that will cause some criticism is the adoption of a new system of coordinate reckoning. Latitudes commence with zero at the South Pole and increase to 180° at the North Pole, and longitudes begin with the present 180° as zero or 360° and run eastward round the sphere. This departure from convention seems to carry no merits beyond the elimination of the letters N. and S. in latitudes and E. and W. in longitudes.

THE Report of the Director, United States Coast and Geodetic Survey, for the year ending June 30, 1920, is of considerable interest on account of the large number of charts it contains, many of which illustrate the extent of hydrographic survey along important steamer tracks on the coasts of America and its possessions. These maps show how much detailed work is required even in much-frequented channels in order to ensure safe navigation. Special emphasis is laid on the need for wire-drag surveys on the rocky coasts of the Pacific States and Alaska. The Director also makes a plea for the survey of Alaska, and shows in several charts and diagrams how little has already been done. Ninety per cent. of the coastal waters are uncharted; where surveys have been made a startling number of dangers to navigation has been discovered. It is essential also that the survey control points in Alaska should be linked up with other surveys of the United States or Canada. Operations have been begun with the cooperation of the Canadian Government for a line of triangulation from Seattle through south-eastern Alaska, the so-called "panhandle," to the Yukon Valley and Bering Strait. The report indicates the progress made in the detailed survey of the Virgin Islands recently acquired from Denmark.

MR. A. W. GILES has studied and mapped the eskers in the vicinity of Rochester, New York, in Proc. Rochester Acad. Sci. (vol. v., pp. 161–240). A very useful bibliography of 126 papers is appended. Mr. J. G. Goodchild's Eden Valley papers (*Geol. Mag.*, 1875, and Quart. Journ. Geol. Soc., vol. xxxi.) might be included, since he was one of the first authors to urge a sub-Glacial origin for gravel ridges. Mr. V. Tanner's detailed description of the Lapland eskers (*Bull. Comm. géol. Finlande,* 1915) might also be added as an elaborate modern study of the deposits of continental ice. Mr. Giles systematically reviews objections to the sub-Glacial theory of eskers, and concludes firmly in its favour. The knolls on esker-crests and the interruptions in chains are accounted for in several reasonable ways, and it is made more than ever apparent that an unnecessary amount of mystery has grown up round the subject since Hummel's explanation was published nearly fifty years ago. Even the nomenclature has become confused, and Mr. Giles's sentence, "The Swedish word 'os,' plural 'osar,' sometimes written 'as (asar),' has priority," contains, unfortunately, two linguistic errors.

THE history of geological research in the United States has been enriched by Mr. G. P. Merrill's "Contributions to a History of American State Geological and Natural History Surveys," a volume of 550 pages, published as Bulletin 109 of the Smithsonian Institution in 1920. Numerous portraits of the pioneers are given, and a great deal of instructive information may be gathered as to the functions of local surveys and their relations to other State Departments. Much of the material was originally collected by the U.S. Geological Survey, which has now permitted publication in this convenient and comprehensive form. The author refers also to Bulletin 565 of that Survey, in which Mr. C. W. Hayes summarised the work of the Surveys of the separate States.

RECENT drainage operations in the Awanui Swamp in North Island, New Zealand, have disclosed the existence of an elaborate drainage system many miles in extent which, there is good reason to think, may antedate both the Maori and their predecessors, the Moriori. The discovery is described by the *Times'* New Zealand correspondent in the issue of June 16. The drains are said to be uniformly about 5 ft. in width and 5 ft. in depth, with regularly sloped sides, the bottom being about 3½ ft. wide. They run for many miles across country in parallel lines perfectly straight, with numerous right-angle cross-drains. An indication of their age is afforded by the fact that in places huge trees of slow growth have grown up in the drains after their formation and decayed. The remains of deeply embedded posts with sharpened ends on a mound in one part of the swamp indicated that it had been the site of a building. A remarkable piece of carved wood in the shape of a lintel, which was found at a depth of 5 ft., has just been secured for the Auckland Museum. In its centre is represented a human figure "almost gorilla-like in appearance"; it has a broad, wedge-shaped head with projecting ears, small broad nose, and a large oval mouth with small tongue. The body is small, short, and squat. The outstretched hands of the figure rest upon a perforated framework spreading right and left, the ends of which each terminate in a saurian-like head. Water-worn stones of the size of a hen's egg which have human features carved on them have also been found. The antiquity of these remains, as well as their style and technique, would appear to preclude their attribution to either Maori or Moriori.

THE American Association for the Advancement of Science, the National Academy of Sciences, and the National Research Council have appointed small committees which held a joint meeting on April 9 last to consider the problem of the conservation of the natural resources of the United States (*Science* of June 3). A resolution was passed recommending that the committees already in existence should function as a joint committee on national conservation, and at subsequent meetings of the three organisations represented the resolution was confirmed, and funds were provided for defraying the immediate expenses of setting up an executive and secretarial agency for the prosecution of the work. The main objects of the organisation which is to be established are stated under five headings; first, to direct scientific research so that it may bear more directly on the problems of conservation, a consideration which will involve a wide knowledge of the scope of any problem, and its relation to the programmes of research in other fields of work; secondly, the collection of data relating to natural resources, and their interpretation in relation to the economic, industrial, and social welfare of different regions, and of the nation as a whole; thirdly, to introduce the principles of conservation into the curricula of educational institutions; fourthly, to lead a campaign of popular education in the meaning of conservation; and fifthly, to correlate the efforts of existing agencies which are striving for conservation in their own particular fields. We shall await with interest the development of this scheme for economising the natural resources of the United States.

DRY weather has been persistent in England during several months, and now that we are more than halfway through the first month of summer the absence of rain has become serious. The observations at Greenwich, which very fairly represent England, show that the conditions are most exceptional. The Greenwich rainfall was below the normal for each of the eight months from October, 1920, to May, 1921, and compared with the average for 100 years the deficiency of the period is 6·21 in.—approximately equal to the normal rainfall for the four months February to May. There have, however, been only two months, November and February, with the rainfall less than an inch. The total measurement of rain for the eight months is 9·32 in., which is 60 per cent. of the average. An examination of the Greenwich observations for the last 105 years shows only one corresponding period as dry, the rainfall for October, 1879, to May, 1880, amounting to 8·24 in., a deficiency of 7·29 in. October, 1873, to May, 1874, had 9·60 in. of rain, and the next driest was apparently October, 1897, to May, 1898, with 10·50 in. There have been several spring droughts in the last 100 years, and for the four months February to May there have been ten years with the total measurement less than 4 in. This year the measurement for February to May was 3·78 in. The years with the smallest measurements for the corresponding period are 1834 with 2·60 in., 1857 with 2·76 in., 1863 with 2·90 in., and 1874 with 3·16 in. Temperature throughout the past eight months was abnormally high, the mean for each month at Greenwich being above the average and the excess for the whole period 2·3°.

AN interesting paper on the cause of quenching cracks in steel was presented at the May meeting of the Iron and Steel Institute by Messrs. Honda, Matsushita, and Idei. The cause is generally believed to be (1) the non-uniform distribution of temperature in the specimen during quenching and (2) the difference in martensitic expansion of adjacent parts during quenching. A closer examination of the phenomena, however, shows that the true cause is not so evident, for the sound due to cracking is often heard some ten seconds after quenching. In small pieces of steel the periphery is harder than the central portion only in a mild quenching; with a medium quenching the hardness is nearly equal throughout; while with hard quenching the periphery is always softer than the interior. This anomalous phenomenon is explained by the presence of arrested austenite in martensite. The quenching cracks in small pieces of steel occur when the hardness in the central portion is much greater than in the periphery, and they are attributed to the stress caused by the difference in the specific volumes of austenite and martensite. The specific volume of the former is smaller than that of the latter, and hence the central portion exerts a large tangential tension on the periphery. Since the difference in the specific volumes increases as the temperature falls, the cracking usually takes place when the temperature of the quenched specimen approaches that of the room. In a hard quenching the hardness gradually increases with the lapse of time owing to the gradual transformation of the arrested austenite into martensite.

MR. A. S. E. ACKERMANN's first paper dealing with experiments with clay in its relation to piles was the subject of a note in NATURE for March 27, 1919. In his second paper on the same subject—read before the Society of Engineers in October last—the author takes the opportunity of correcting some errors which appeared in the first paper, and points out that further work has confirmed all the previous conclusions excepting that the effect of temperature on the supporting capacity appears to be limited to stresses below the pressure of fluidity, and that the sides of a hole appear to crush in before the statical head is equal to the pressure of fluidity. Unquestionably the most interesting of Mr. Ackermann's results is that clay possesses a pressure of fluidity at which the loaded pile sinks through the clay without further increase in the load. This critical pressure depends upon the percentage of water present, being greater with less water. Mr. Ackermann has added to his former work in the direction of experiments designed to separate the work done against frictional resistances from that done in displacing the clay, and finds that the former is by far the larger quantity. A number of experiments have also been made on chalk, and the author finds that wet powdered chalk has a modified pressure of fluidity, and that the water-content affects greatly the properties of chalk. There is a marked difference in the physical properties of powdered chalk as compared with precipitated chalk. The adhesion and cohesion of wet chalk are much less than those of clay; clay is hygroscopic and chalk is not.

The *Daily Mail* of June 13 published an article by a scientific correspondent under the sub-heading "Can Eyes Radiate Energy?" which gives some account of a new instrument showing that "rays proceed from the eye which are capable of being registered just as wireless messages are detected." Dr. Charles Russ, the inventor of the instrument, writes to us stating that the paragraph constitutes a breach of confidence on the part of someone to whom the instrument was shown. It was intended that the phenomenon should be announced at the Ophthalmological Congress at Oxford on July 7, and some annoyance has been caused to Dr. Russ by this premature disclosure.

Mr. A. Risdon Palmer is bringing out through Messrs. George Bell and Sons, Ltd., a series of Handbooks of Commerce and Finance planned to meet the need of a simple and graphic presentation of the fundamental principles of commerce and finance. The first three volumes, dealing respectively with "Transport and the Export Trade," "The Import Trade: Mixing Commodities," and "The Use of Graphs in Commerce and Industry," will be ready shortly.

Our Astronomical Column.

The Meteoric Radiants of June 25–30.—Mr. Denning writes:—The possible occurrence of an abundant meteor shower from Pons-Winnecke's comet will attract a great number of astronomical observers to watch the heavens. The moon will rise late, and, being at her last quarter, will not offer any serious impediment to observation.

There are a considerable number of radiant points visible at this period of the year, though the usual rate of apparition is not nearly so great as in the two following months of July and August.

The great shower of Perseids probably begins at the end of June, and the radiant is then situated at about 0°+36°. As it may prove useful for reference, a list of the principal radiant points observed in past years between June 25 and 30 is appended:—

0°+36°
24+42
30+36
43+37
48+44
161+58
193+57
213+53

238°+47°
245+64
260−24
261−12
261+ 4
263+63
270+47
270+30

282°−12°
282−24
291+52
291+60
294+40
304+23
305−12
314+47

314°+61°
320+11
320+21
334+57
334+28
342+39
354+39
354+77

Report of the Kodaikanal Observatory for 1920.—It has already been mentioned in this column that direct comparisons of the solar lines with those of cyanogen and iron gave results fairly near those predicted by Einstein, but since the shifts were different for different substances, and also not proportional to the wave-length, they could not be wholly due to a gravitational effect. Tests made on the Venus spectrum gave further evidence of the shift being in part an "earth effect." A considerable improvement has been effected in the Venus spectra by using "Barnet Ultra Rapid" plates hypersensitised with ammonia; these enabled a very narrow slit to be used. When the terminator was placed normal to the slit, no evidence was obtained of an inclination of the spectral lines due to rotation of the planet. A recent letter from the director states that further photographs will be taken to test the rotation in sixty-eight hours about a highly inclined axis that was recently provisionally announced by Prof. W. H. Pickering. It was found that change of altitude produced no change in the wave-lengths in the Venus spectra, the range of altitude extending from below 20° to above 40°.

The use of an ultra-violet spectrograph with a quartz collimating lens demonstrated the solar origin of the ammonia band in the solar spectrum at λ3360, since the rotation shift between the east and west limbs was shown.

The spot activity, as indicated by the number of groups, diminished 40 per cent. in 1920 as compared with 1919. It is noteworthy that the spot group associated with the great magnetic storm of 1920 March 22–23 returned five times (1920 January to May), there being a magnetic storm on each occasion.

Unlike the spots, there was an increase in both prominences and hydrogen absorption markings as compared with 1919. A great eruptive prominence seen in 1920 December 31 strongly resembled that seen in the eclipse of 1919 May. A continuous series of spectrograms was secured, which showed the prominence matter ascending rapidly and fading away at a height of 16′ above the limb.

Popular Astronomy in Sweden.—We have already directed attention to the *Popular Astronomisk Tidskrift;* Häfte 1 o. 2, 1921, is another number full of interest. We may refer specially to an illustrated article by V. Carlheim-Gyllensköld on Tycho Brahe and his observatory on the island of Hven; many photographs of the present aspect of the latter are given, showing that it is still possible to trace out the outlines of the foundations of all the buildings and instruments. A portrait of Tycho Brahe and a photograph of the house where he was born are also reproduced, together with many relics unearthed from the ruins.

The latitude of Sweden favours observations of auroræ, which are made systematically at several stations. The auroræ of September 28 and October 17, 1920, are described in detail, with diagrams indicating the exact locations of auroral streamers among the stars.